

REMARKS

Claims 1-31 were pending in the case and all stand rejected. Claims 1, 2, 6-15, 16-19, 23-25 and 27-31 stand rejected under §103 as unpatentable over Rouet in view of Brinsmead. Claims 3-5, 20-22 and 26 stand rejected under §103 as unpatentable over Rouet in view of Brinsmead and further view of Klassen.

Present Application

The present application, as the Examiner appreciates, is directed to the technical problem of combining (compositing) images relating to a particle system with images relating to geometric objects. See specification paragraph 4:

Because a typical scene in a movie may have some objects that are best modeled using geometry-based renderers and other objects that are best modeled using particle systems, there exists a need to render portions of the image with the different types of renderers and then composite the partial images into a single image. But compositing the image generated from the particle renderer with the image generated from the geometry renderer can be difficult. The traditional solution to this problem is three-dimensional image compositing.... This solution, however, may lead to aliasing around the silhouette of the image being composited, and it lacks support for motion blur and depth of field. (Emphasis added.)

Hence the present inventors arrived at the solution set forth under Summary of the Invention at paragraph 5:

The compositing is accomplished by incorporating geometry information from the geometry image as a number of special particles used by the particle renderer. But instead of contributing to the color and opacity of pixels in the particle-rendered image, these special particles occlude or subtract from the accumulated color and opacity of those pixels. In this way, depth resolution is done as part of the particle rendering process, and the geometry and particle images can be easily combined, for example, by alpha blending. (Emphasis added.)

It is respectfully submitted that the references, either alone or in combination, neither recognize this technical problem nor provide the solution here, as explained further below.

Rouet Reference

Rouet does not disclose particle systems. Instead he uses a geometric object-type model which, of course, is the alternative here to a particle system. This is clearly set forth in the Rouet disclosure, see Abstract, “Methods and apparatus for creating lifelike digital representations of scenes that include numerous fine-grained objects such as hair. Individualized geometric models are defined for a selected, manageable subset of the fine-grained objects.” (Emphasis added.)

Hence Rouet is using a geometric object approach to showing hair or fur. See Summary of the Invention of Rouet at column 1, beginning line 56 “Steps and means are described by which individualized geometric models are defined for a selected, manageable subset of the fine-grained objects.” There is extensive reference to the use of geometric models and geometries in this context, see column 3, line 8, column 4, line 21, column 4, line 28, and throughout Rouet where it is made clear that his approach is the geometric object modeling one for hair. It is well known in the field that this geometric model approach is best used for more well defined objects as compared to use of particle rendering which is more suitable for fuzzy-type objects since it uses more simply data structures than the geometric model approach.

One significant difference between such well defined objects and fuzzy, soft and semi-translucent objects (such as clouds) is that the fuzzy objects do not have precise geometric boundaries. Such fuzzy objects are usually best modeled using particles (typically spheres or ellipses having one or two central points and associated radiuses conventionally) without the need for precise depth information. Fine grained objects such as fur or grass are very sensitive to aliasing due to their lack of geometric precision or depth. Hence Rouet uses the higher precision geometric object approach to represent fur rather than the conventional geometric approach. In contrast, the present application is directed to particle rendering which is especially advantageous for fuzzy-type objects.

Note that there is no particular relationship between the “fine grained objects” or geometric modeled objects of Rouet and particles or particle systems in the animation context. Particles, unlike geometric objects, typically only have a single depth value and it is generally found are less useful for modeling objects such as hair or fur. Particles are generally better for fuzzy-type objects such as clouds, fire, water, atmosphere, etc. although not so limited.

Hence Rouet is not a particle system and does not use cutout particles.

Brinsmead Reference

The other chief reference Brinsmead is indeed directed to particle systems and attempts to use them for rendering animation of hair. As pointed out in the Brinsmead Abstract this is “A method for simulating and rendering hair.” Brinsmead moreover, since it does discuss particle systems at length, points out the distinction between particle systems and geometric models, for instance, see column 2, beginning line 15 “Along the path of the particle system, a lighting model and a frame are used to render pixels directly rather than through a notion of detailed microgeometry.” Brinsmead briefly explains particle systems at column 4, line 55 “Particle systems, in essence, are graphical engines implemented in either hardware or software that emit particles from a surface. Each surface may have one or more emitters associated therewith for emitting particles. Particles have physical characteristics including: mass, elasticity and friction.”

Moreover, as pointed out by Brinsmead, Brinsmead is directed to “simulation and rendering” using particle systems, see under Summary of the Invention at column 2, line 33 “The present invention is divided into two parts: simulation and rendering. A simulator calculates the motion dynamics of a hair.... The renderer performs a variety of tasks, including fuzzy segment generation and self-shadowing, that results in an image being displayed on a display device.” However, Brinsmead does not deal with the compositing aspect but merely with the simulation and rendering which, of course, are pre-compositing. As well known in this field, compositing refers to combining. See Rouet, column 7, beginning line 19 “At step 260, the fully rendered hair is combined (or “composited”) with other elements of the scene being represented.” This is the

typical understanding of the terms “composited” or “compositing” in this field, and as pointed out in that passage, follows the rendering steps. Note that Brinsmead only mentions the compositing step 260 in passing since he is chiefly concerned with the simulation and rendering, both of which are pre-compositing.

Moreover, since Brinsmead only deals with particle systems he has no need to composite them except as in step 260 since it is not part of the technical problem which he addresses. Hence while Brinsmead does disclose particle systems there is no compositing (except as in 260) in Brinsmead and no mention of combination of particle system images with those generated using geometric objects. Brinsmead does not disclose use of geometric objects at all except as, of course, an alternative to use of particle systems.

Hence in summary Rouet does not disclose or use particle systems but uses geometric models. There would be no particle systems or cutout particles and no combination of geometric objects as disclosed in Rouet with particle systems, since Rouet is only concerned with geometric objects. In contrast, Brinsmead is directed to simulating and rendering particle systems. There is no discussion or mention in Brinsmead of geometric objects except as an alternative to particle systems and no particular method of compositing with geometric objects or other types of objects.

Claim Amendments

Certain claims have been amended. This is in no case for reasons of patentability or responsive to any rejections and is not to narrow the claims, but it is intended to improve their form and clarity. See Claims 1, 4, 6, 11, 14, 15, 16, 19, and 24. As regards apparatus Claim 24, the amendments are to improve form and to indicate connections where relevant between various claims elements. Moreover, it is understood that Claim 24 was not examined under §112, paragraph 6, and it is respectfully submitted is not a “means for” type claim under that statute.

Claims Distinguish Over References

It is respectfully submitted that Claim 1 distinguishes over Rouet and Brinsmead, even in combination. As pointed out above, Rouet is directed to rendering and compositing geometric objects. Brinsmead is directed to simulating and rendering particle systems. Both are directed towards modeling hair and fur for animation. Hence, it is not seem why there would be any motivation to combine the two references since they are alternative approaches to the same technical problem, which is animating hair and fur. Rouet takes the approach that geometric objects are an appropriate method of animating hair or fur. Brinsmead prefers the particle systems approach for hair or fur. As alternatives, it does not seem obvious that one would necessarily combine the teachings of the two, or even how one would do so technically so as to be operative. The Examiner in his rejection does not address this operability issue at all.

The Examiner supplied his motivation for the combination of the two references at page 3 of his action "It would have been obvious to one of ordinary skill in the art to combine the teachings of Rouet et al. with Brinsmead because this combination would provide visually accurate and efficient generation of particles that are non-occluded and composited with geometric objects and backgrounds." However the Examiner does not say where the desire to do this comes from. It is certainly not present in either Rouet or Brinsmead since neither addresses compositing particle systems with geometric objects. Moreover as pointed out above, even if one believed that this motivation might be adequate, there is the problem that the two disclosures of Rouet and Brinsmead are directed to two competing technical solutions to the same problem and it is not clear how one would combine them as suggested by the Examiner. Presumably since Rouet teaches compositing and Brinsmead teaches particle systems, the combination results in compositing of particle systems. This would not, however, be the same as compositing of particle systems with geometric objects. Hence again the motivation is lacking for the combination of references as used by the Examiner.

Moreover it is respectfully submitted that the Examiner somewhat mischaracterized Rouet where at his page 2 of his action, the Examiner states in pertinent part "...Rouet et al. teaches a computer-implemented method and system for animating an image...that includes one or more

geometric objects,...and one or more particle systems, which are collections of independent objects, as described in column 1 lines 53-58.” (Emphasis added.) There is no mention of particle systems in this portion of Rouet which, as pointed above, is the competing geometric object approach. Rouet does not seem to mention the particle systems approach at all. The Examiner also misstates Rouet in that same paragraph “Rouet et al. also teaches cutout particles that occlude particles of the particle systems in column 8 lines 28-31, where it is described that hair particles occlude other objects within the scene.” (Emphasis added.) While Rouet does disclose occlusion here, it is not in the context of particles but in the sense of geometric objects occluding one another. Hence in this respect, the Examiner has perhaps mischaracterized Rouet since, as well known in the field and as clear from the citations quoted above in the present references, geometric objects or geometric modeling is not the same as particle systems. That is, these are two separate approaches, neither one being generic to the other or a species of the other. Instead, they are somewhat competing technology typically used for animating different types of images.

Hence, Rouet does not meet a number of aspects of Claim 1, including in the preamble “an image based on a scene description that includes...one or more particle systems.” There are no particle systems in Rouet. Moreover, Rouet does not, as in the first step of Claim 1, perform “generating a plurality of cutout particles, each cutout particle corresponding to a geometric object in the scene description;”. Instead, Rouet occludes one geometric object with another. While this occlusion might be considered to be a cutout, it is not a use of a cutout particle. Moreover, clearly Rouet does not perform the second step of Claim 1 “rendering the particle systems with the cutout particles to generate a particle image” since, of course, in Rouet there are no particle systems or cutout particles. Moreover, of course, Rouet does not even consider the last step of Claim 1 which is “compositing the particle image with an image of the geometric objects” since, as pointed out above, Rouet is strictly working with geometric objects, not with any particle images.

The Examiner combines Rouet with Brinsmead to meet Claim 1. However, as pointed out above, the reason or motivation to make such a combination is lacking since these references are somewhat competing approaches to the same problem. Moreover, Brinsmead does not deal with the problem of occlusion or cutouts but is merely concerned with simulation and rendering of the

particle systems. Hence Brinsmead lacks as in the preamble of Claim 1 “one or more geometric objects”. Also, Brinsmead fails to meet any of the steps of Claim 1 since he is only concerned with the particle systems themselves rather than combining same with cutouts or occlusions. Moreover, of course, there is no relevant compositing in Brinsmead since Brinsmead is concerned with the pre-compositing steps of simulation and rendering. Hence even the combination of these two references, even if the combination is appropriate which it is believed it is not, fails to meet Claim 1.

Claims 2-15 and new Claim 32 dependent upon Claim 1 distinguish over the references for at least the same reason as do the base claim. The addition of Klassen fails to make good the deficiencies of the two primary references in terms of meeting the claims.

Apparatus Claim 24 is directed to a system which has similar aspects to the method of Claim 1 and hence distinguishes over the references, even in combination, for at least the same reasons as pertain to Claim 1. The same goes for Claims 25-31 dependent upon Claim 24.

Claim 16 is a second independent method claim of different scope than Claim 1. The Examiner rejected Claim 16 upon the same references as Claim 1. Again, it is believed that the Examiner in rejecting Claim 16 mischaracterized Rouet at page 6 of his action by indicating that Rouet discloses rendering one or more particle systems. As pointed out above in connection with Claim 1, that is not the case. Hence, in Rouet there are no particle systems or cutout particles. Instead there is use of the geometric modeled objects.

Moreover, as regards Claim 16 to the extent that Brinsmead is relevant, Brinsmead is only relevant in the sense of showing particle systems. However, Brinsmead does not get into compositing in the context of Claim 16. Hence the aspect of Claim 16 which is to “produce a particle image to be combined with a second image” is not the technical problem addressed by Brinsmead. Hence again, since this compositing aspect is absent from Brinsmead, Brinsmead also fails to meet Claim 16 even in combination with Rouet, even if arguendo such a combination was properly motivated.

Claims 17-23 are dependent upon Claim 16 and allowable for at least the same reasons as Claim 16.

New Claims 32-34

New Claim 32 depends on Claim 1 and is allowable for at least the same reasons as Claim 1. Claim 32 is supported by e.g. original Claims 24 and 25.

New independent Claims 33-34 are directed to similar subject matter as respectively independent Claims 1 and 24 and include many of the same limitations in the same order, and also recite additional limitations. Any additional limitations are well supported. For instance, the reference to the “camera location” reads on paragraph 7 of the specification. “rgba image” reads on Fig. 5. “Splatting” reads on paragraph 27. Claims 33 and 34 are allowable for at least the same reasons as respectively Claims 1 and 24.

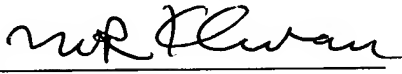
CONCLUSION

In view of the above, all pending claims in this application are believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone interview would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. **590282001100**.

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Respectfully submitted,

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